CHAIN COMMANDS

This section will build on the previous sections to make a "chain" of the stored points, curves and spirals. The really fun part is an investigation and explanation of the different ways to "store chain" using this previously stored data and how to "Describe" a chain to see if the alignment gives the desired result.

Included here also is a discussion of storing an <u>open alignment</u> (an alignment with everything known). Then how to print and list stored chains.

<u>STORE CHAIN COMMAND LINE SYNTAX</u> Where the NAME consist of one to nine alphanumeric characters chain which represents a list of stored points (POI), curves (CUR) and spirals (SPI), SCS curves (SCS) and other chains. SPECIAL NOTE: The shift command in the middle of page 9-5.

<u>Store CHAin name list (STAtion station)</u>
S CHA L 10 SCS C1 CUR C2 SCS C3 SCS C4 60 STA 10+00.00

The following is a sequence of line commands to station a shift (LT & RT) alignment with equations from a main alignment
S CHA SBL 1 SCS S10 SHIFT 4 9 10 SHIFT 11 SCS S11 13
STA CHA SBL BEG 480+00 1 AH
STA CHA SBL BEG 548+46,58 4 AH
STA CHA SBL BEG STA 580+86.34 11 AH

<u>DESCRIBE CHAIN COMMAND LINE SYNTAX.</u> The describe chain command gives a report of the stored chain and describes its geometry including coordinates, stations, distances, bearings, curves, and spiral data.

<u>DEScribe CHAin</u>
DES CHA SBL

<u>ADDITIONAL CHAIN COMMANDS</u>:

PRINT CHAIN. This command displays a list of elements stored for the specified name (where name is the stored chain to be printed).

<u>PRInt CHAin name</u>
PRI CHA Y1

STATION CHAIN. Where name is the stored chain, station is the initial station to start and object is the element to which the element is applied

<u>STAtion CHAin name   BEGin station   object (AH) (BK)</u>
STA CHA NC125 BEG 542+21.96 4 AH
STA CHA Y6REV BEG 10+00.00 20 BK

OPEN ALIGNMENT

This section will investigate Open Alignment (alignment where every thing is known) and Incomplete alignment (alignments with something unknown); and how to store a station equation or two.

OPEN ALIGNMENT COMMAND. The open alignment command is the first statement required to generate a new chain or alignment name and activates the open alignment grope of commands.

ALIgnment name OPEN
ALI L1REV OPEN

INITIAL POINT (POT) COMMAND FOR OPEN ALIGNMENT The initial point command represents the starting point of the new alignment or chain name. There is an optional station command which if not used will start at 0+00.00

FORMAT A:
POT *pa* **TD direction (STAtion station)**   where *pa* is a previously stored point
POT 10 TD N 16 52 32 E STA 24+25.36

FORMAT B:
POT n   N northing E easting TD direction   (STATION station)
POT 100   N 76531.66 E 2094824.90   TD N 16 52 32 E   STA 12+00.04

POT n X easting Y northing TD direction   (STATION station)
POT 100 X 2094824.66   Y 76531.66   TD N 16 52 32 E   STA 12+00.04

INTERMEDIATE POT COMMAND FOR OPEN ALIGNMENT

The INTERMEDIATE POINT commands represents an intermediate point *pi* on the open alignment calculated by the distance TL distance and the forward direction from the previous element. In Format B the direction TL distance is modified by the optional (P/M (DEF) angle).

FORMAT A
POT *pi* **TL distance**

The point pi is calculated By its TL distance measured from the previous PT and the direction given from the previous element.
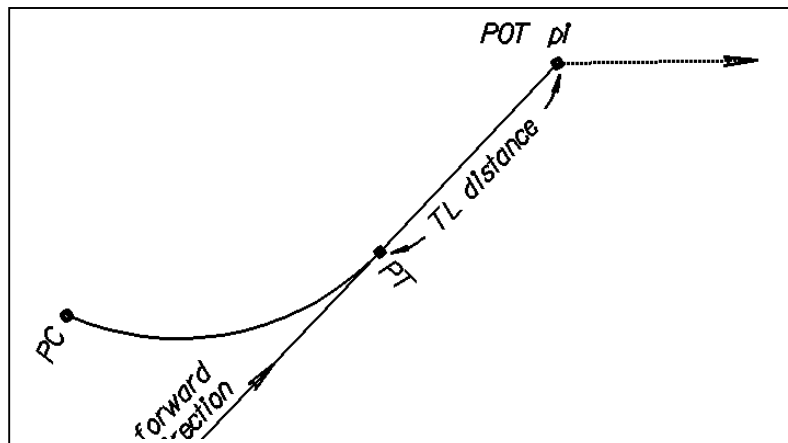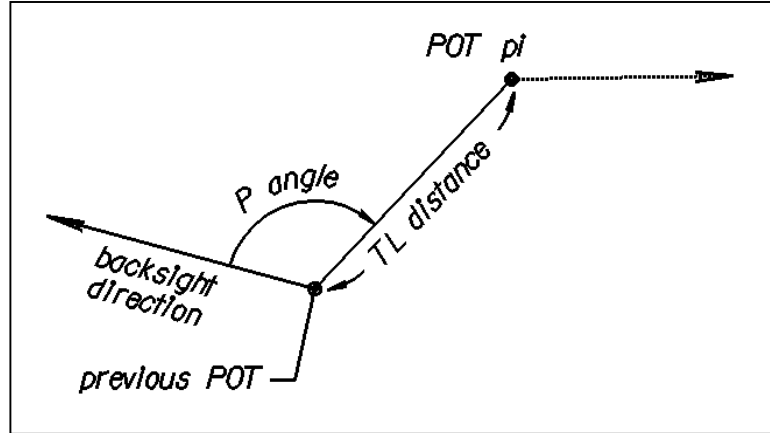
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FORMAT B
The point *pi* is calculated by its TL distance measured from the previous POT and the direction defined via backsight direction plus clockwise angle (P angle)

<u>**POT** *pi*</u>   <u>**(P/M** **(DEF)** **angle)**</u> <u>**TL** **distance**</u>

Or the point pi is calculated by its TL distance measured from the previous PT and the direction defined via backsight direction plus clockwise angle (P angle)
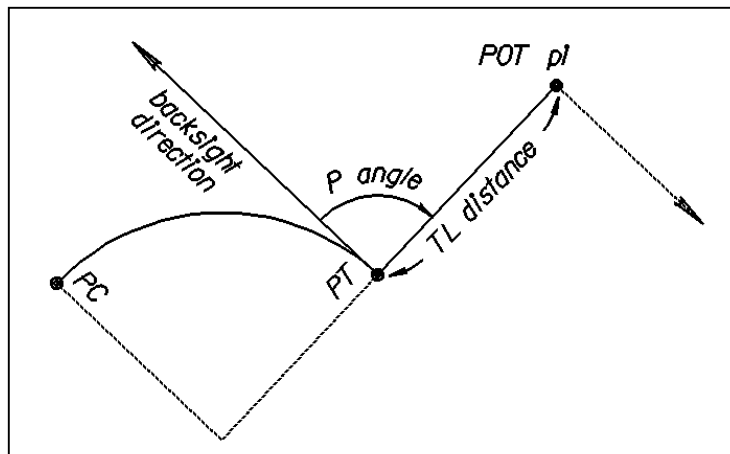
CURVE COMMAND FOR OPEN ALIGNMENT. **The curve command creates a new curve name defined by the given data and is linked to the previous element in the chain. There are four FORMATS for curve data.**

<u>**FORMAT A**</u>: **The back tangent distance TL, a radius or degree of curve and the (P / M) deflection angle DEF, defines the curve name.**

<u>**CURve**</u> <u>**name**</u> <u>**TL distance**</u> <u>**[R radius OR D degree]**</u> <u>**(P / M)**</u> <u>**DEFLECTION**</u> <u>**angle**</u>
CUR C1 TL 0 R 1909.8593 M DEF 20 05 08.2
CUR C1 TL 0 D 3 00 M DEF 20 05 08.2

<u>**Note: TL can be zero if the PC is at the stored point.**</u>

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FORMAT B: The curve name is defined by the back tangent distance TL, degree of curve DEG, and minus deflection angle (M DEF angle). The TL is defined via back sight direction to the previous element plus clockwise angle (DB P angle). For further information, refer to drawing on page 9-43, of the manual.

CURve name   DB (P/M) DEFlection angle   TL distance   Radius radius (P/M) DEFlection angle
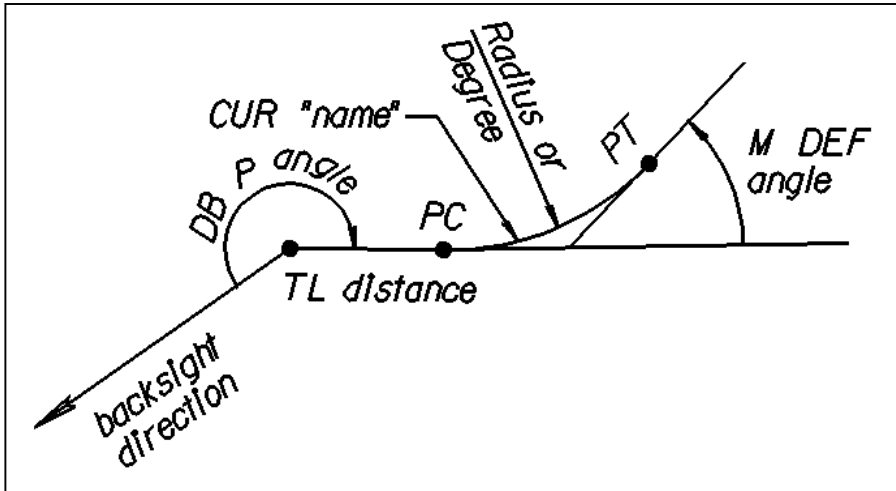
FORMAT C: The curve name id defined by the back tangent distance defined by way of forward direction from the previous element plus deflection angle (DB P DEF angle). For information, refer to drawing on page 9-43 of the manual.

CURve name   DB (P/M) DEFlection angle   TL distance Radius radius   (P/M) DEFlection angle
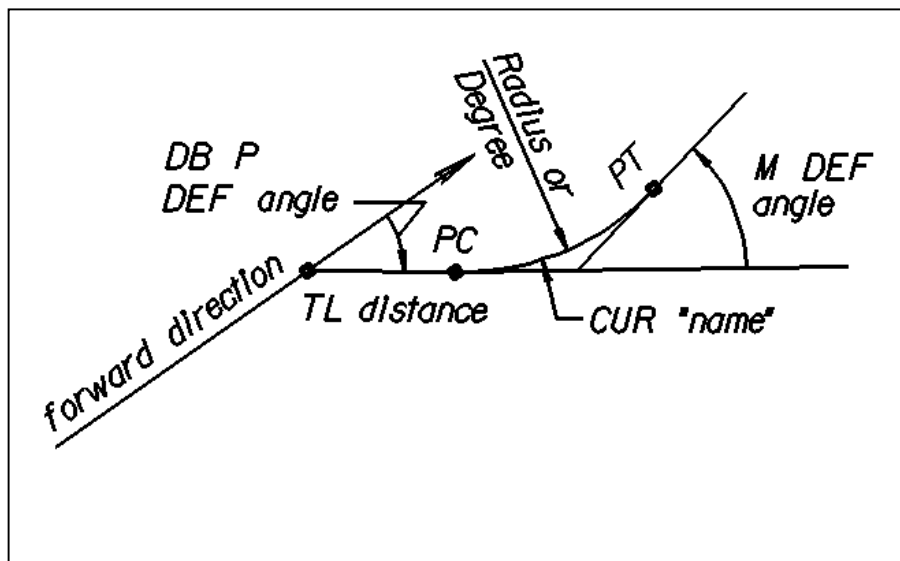
SPIRAL COMMAND FOR OPEN ALIGNMENT The spiral name commands create a new spiral name defined by the given data. The spiral is then linked to the previous elements of the chain. There are two formats for storing spirals. FORMAT A: TYPE 2 is the Ahead spiral; FORMAT B: TYPE 1 is the Back spiral. Refer to drawing pages 9-44 & 45.
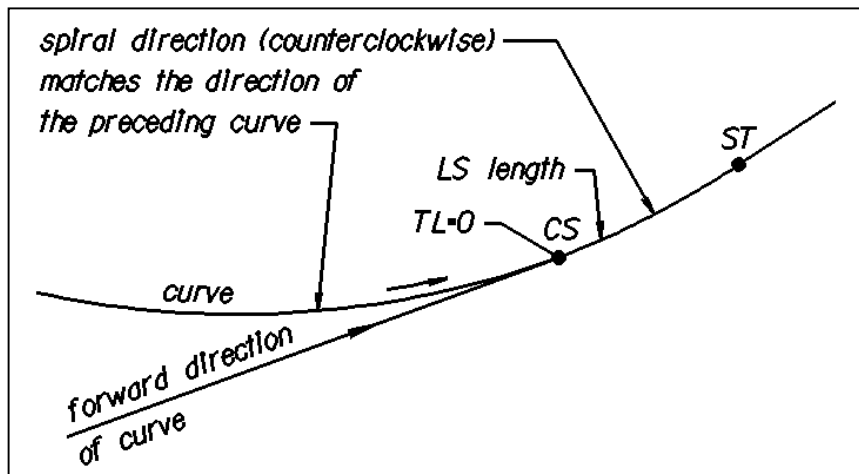
FORMAT A: The back tangent TL, and length of spiral LS, degree DEG of spiral, value TYP value define the spiral name. The direction of TL distance is defined by way of <u>forward direction</u> of previous data (like PI of curve to CS of curve)

SPIral <u>name</u> TL <u>distance</u> <u>LS</u> <u>length</u> (<u>D</u>egree <u>angle</u>   <u>TYP</u>e <u>value</u>)
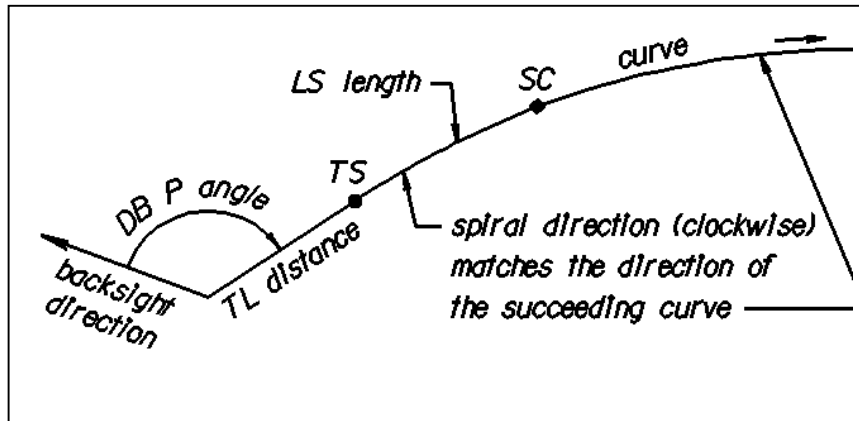SPI S1 TL 92.67 LS 300   D 2 30   TYP 1   (in spiral)
SPI S2 TL 0   LS 300   D 2 30   TYP 2   (out spiral)
Format A

Format B
The back tangent TL and the length of spiral LS define the spiral name. The Direction of TL distance is defined via forward direction of previous data.

The spiral name is defined by the back tangent TL and the length of spiral LS the direction of TL distance is defined via the backsight direction to the previous element plus the clockwise angle (DB P angle).
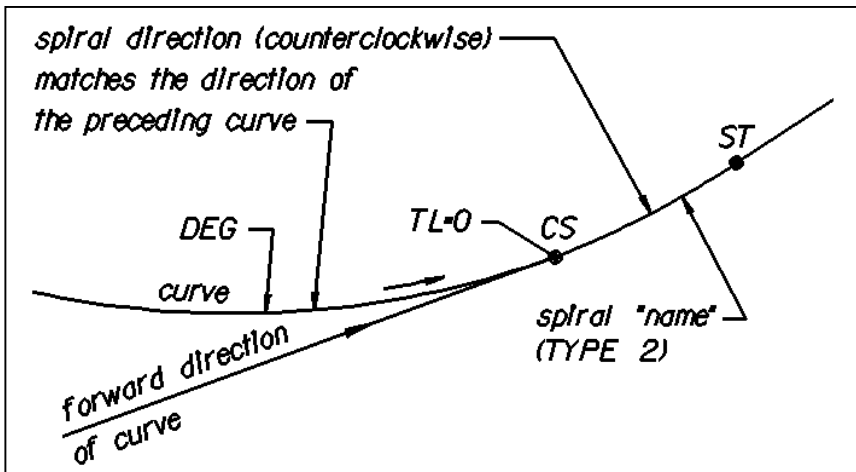
FORMAT B: Optional Degree and Type. The back tangent TL and the length of the spiral LS define the spiral name. The direction of TL distance is defined by way of the back sight direction to the previous element plus the clock the clock angle DB P angle.

<u>**SPI**ral **name**</u>   <u>**DB**</u> (<u>**P/M**</u>) (<u>**DEF**lection</u>) <u>**angle**</u>   <u>**TL**</u> <u>**distance**</u> <u>**LS**</u> <u>**length**</u>
(<u>**D**egree</u> <u>**angle**</u>   <u>**TYP**e</u> <u>**value**</u>)

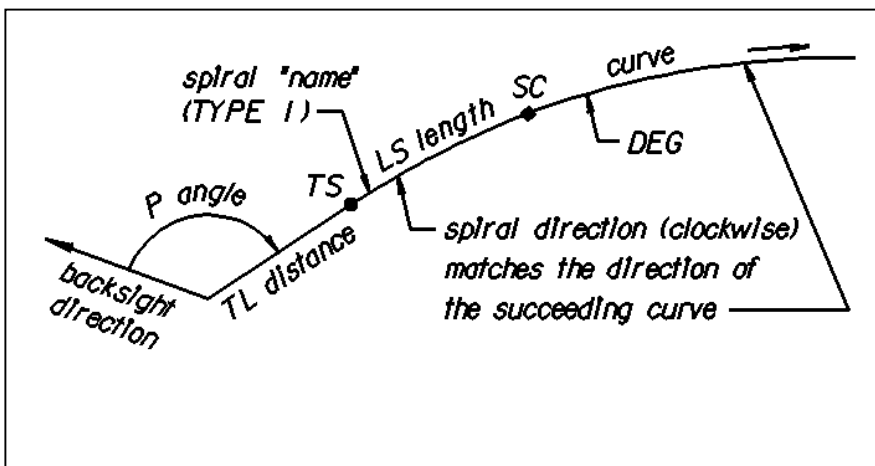**SPI S3 DB 34 45 59   TL 118.87 LS 400 D 2 30 TYP 1   (in spiral)**
SPI S3 DB   TL 0   LS 400 D 2 30 TYP 2   (out spiral)

Format A

The back tangent TL, The length of the spiral LS defines the spiral name, the Degree of curvature and type. The direction of TL distance is defined via forward direction of previous data.

Format B

The back tangent TL, the length of the spiral LS defines the spiral name, the Degree of curvature and Type. The direction of the TL distance is defined via the backsight direction to the previous element plus clockwise angle (P angle).

ENDING POT COMMAND FOR OPEN ALIGNMENT The
Ending POT command represents the terminal point of the open alignment calculated by its distance TL distance and the forward direction from the previous element.

FORMAT A: the point pa is calculated by TL distance measured from the previous PT and direction is defined by way of forward direction from the previous element.

<u>POT</u> *pa* **((<u>P/M</u> (<u>DEF</u>) <u>angle</u>) <u>TL</u> distance**
POT 200 TL 1022.98

<u>POT</u> <u>pi</u> <u>N</u> <u>northing</u> <u>E</u> <u>easting</u> (<u>P/M</u> (<u>DEF</u>) <u>angle</u>) <u>TL</u> <u>distance</u>
POT 200 N 311485.8014 E 2127353.5442 TL 1002.9800
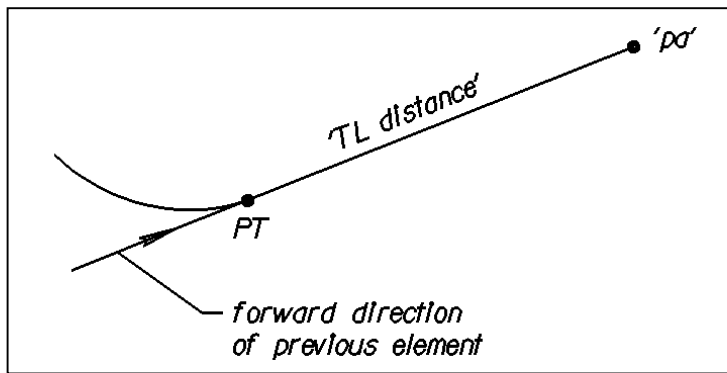
FORMAT B: the point pi is calculated by TL distance measured from the previous PT and direction is defined by way of forward direction from the previous element
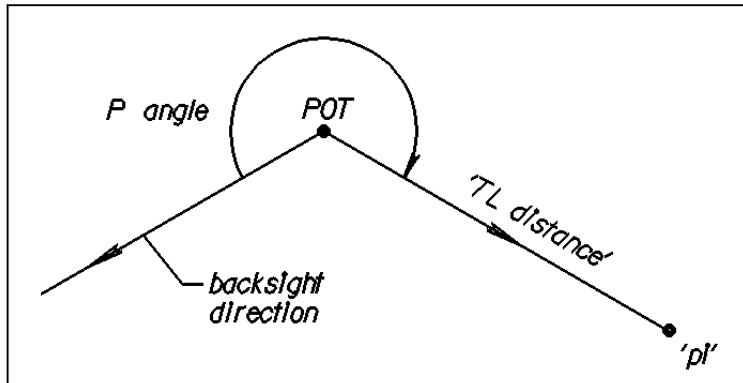
<u>POT</u> *pa* <u>TL</u> <u>distance</u> <u>TD</u> <u>direction</u>
POT 200 TL 1022.98   n 67 29 22 w

END ALI COMMAND FOR OPEN ALIGNMENT The end
alignment statement is the last statement required in an alignment.

<u>END</u> <u>ALI</u>gnment (<u>name</u>) (<u>DES</u>cribe)
END ALI SURVEY DES

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EXERCISES   WRITE OPEN ALIGNMENTS FOR THE FOLLOWING

EXERCISE 1 use spiral types
ALIGNMENT "HWY49"
POINT 100 IS N 311046.263 E 2117853.186
THE DISTANCE TO THE SPIRAL IS 3133.8718 N 39 34 53 E
SPIRAL NAME IS S11 AND THE LENGTH IS 500
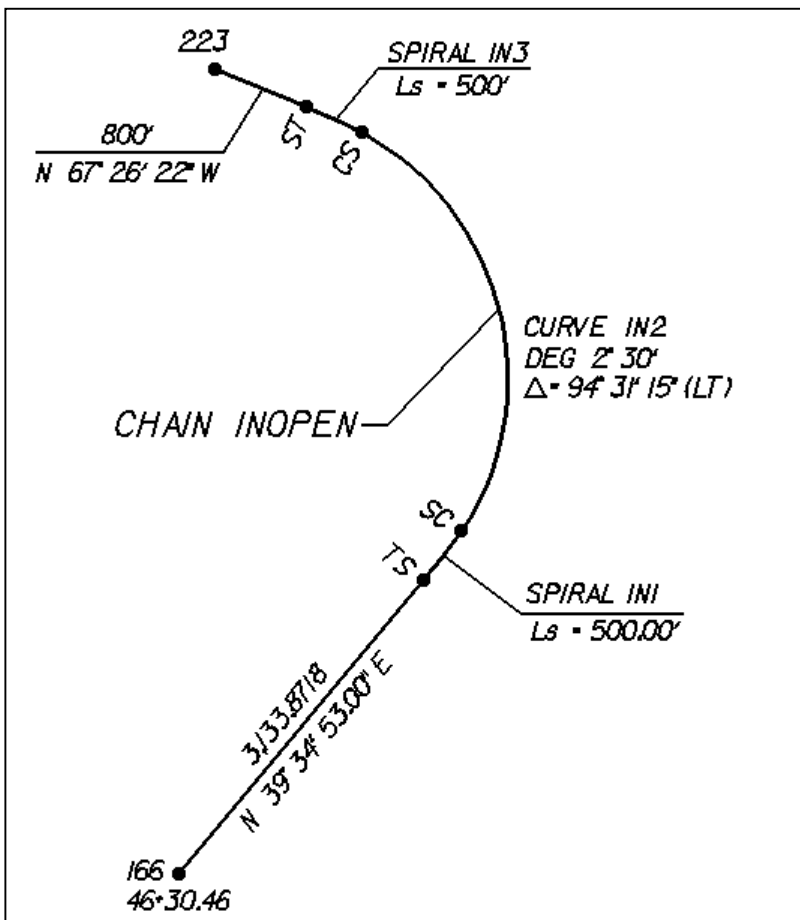**THERE IS A CURVE C12 AT THE END OF THE SPIRAL WITH A DEG OF 2 30**
THE DELTA IS 94 31 15 LT
THE ENDING SPIRAL S13 LENGTH IS 500
THE ENDING POINT 200 IS 800 FROM THE END OF THE SPIRAL (ST) AT
N 67 26 22 W

EXERCISE 2 same as exercise 1 without using spiral types, assume 10000,10000 on point 166

The reference is made to the GEOPAK manual, Part II Coordinate Geometry, Chain Commands, Section 9 and to GEOPAK online Help.